

REMARKS

In the first Office Action, the Examiner objected to the specification with respect to the Cross-reference to Related Applications sections needing updating. The Examiner objected to the drawings with respect to boxes 14, 19 in Figure 1 not being labeled. The Examiner rejected claims 1-18 under 35 USC §112, second paragraph with respect to the term "substantially". The Examiner rejected claims 1-18 under 35 USC §103(a) as being unpatentable over Burns (US 5,953,10) in view of Marinelli et al. (US 5,890,796).

Applicants have amended the specification and drawings in addition to claims 1, 3, 5, 7-10, and 18, while adding new claims 19-26 as shown in the above claim listing. Claims 1-26 are currently pending in this application. Reconsideration and re-examination of the application as amended is respectfully requested.

Objection to the Specification

Applicants have updated the "Cross-Reference to Related Applications" section to obviate the Examiner's objection.

Objection to the Drawings

While Applicants respectfully submit that the drawings as filed satisfy the requirements of 37 CFR §§1.81 and 1.83, Applicants submit herewith a revised Figure 1 with boxes 14 and 19 labeled for the Examiner's approval. The revised Figure 1 is believed to obviate the Examiner's objection.

Rejection Under 35 USC §112

The Examiner rejected claims 1-18 under 35 USC §112, second paragraph, as being indefinite relative to the term "substantially" in claims 1, 3, 5, 10, and 18. Applicants respectfully disagree and traverse the Examiner's rejection.

Applicants respectfully submit that the use of "substantially" in these claims does not render the claims indefinite and that one of ordinary skill in the art would indeed be reasonably apprised of the scope of the invention when reading the claims in light of the specification. In particular, the specification provides various examples of detecting an object using a varying gain or varying threshold and determining the distance to the detected object based on the time between a transmitted and received pulse, or based on the average travel time of a plurality of pulses. As such, the distance

determination is based on a time difference between "substantially" the transmitted and received (detected) times. However, Applicants believe that properly interpreted, claims 1, 3, 5, 10, and 18 have the same scope with or without the term "substantially" and have therefore deleted the term in an effort to advance prosecution and obviate the Examiner's rejection.

Rejections Under 35 U.S.C. §103(a)

The Examiner rejected claims 1-18 under 35 USC §103(a) as being unpatentable over Burns (US 5,953,110) in view of Marinelli et al (US 5,890,796). Applicants respectfully disagree and traverse the Examiner's rejection.

With respect to claims 1, 2, 6-9, the Examiner states that Burns discloses transmitting a near-infrared light pulse to laser optics at a first time and reflecting said light pulse from said laser optics relying on Col. 1, 11. 8-12. Applicants respectfully disagree. Burns '110 discloses a multichannel laser radar system that includes "laser optics" 13. However, the only disclosure of the structure or function of the laser optics is that laser transmitter 12 generates a laser pulse in the laser optics 13 which produces a laser beam 14 directed towards a target 15 (Col. 1, 11. 12-14). This is similar to the prior art described by Applicants (US 5,669,174) in paragraph 4 of the specification which "utilizes an infrared laser to emit pulses of infrared light along a narrow beam path toward an object." As explained by Applicants in paragraph 5 of the specification:

The known system, however, has a substantial drawback. In particular, because the infrared laser emits a beam of light along a narrow beam path, automatically detecting objects over a relatively wide area is not possible. For example, if the known system were mounted in an automotive vehicle, objects in front of an automotive vehicle on a roadway that are outside of the narrow beam path would not be detected and thus their distance could not be calculated.

Applicants' invention as disclosed and claimed provides systems and methods that represent a significant improvement over such conventional systems and methods by using a polymeric light reflector that is extremely thin as compared with conventional reflectors and lenses and provides a wider beam path as compared to a narrow beam path transmitted directly from a laser. Applicants' invention can illuminate a roadway for automatically determining distance of objects on the roadway and may be located in a variety of locations due to small packaging as described in paragraph 11.

With respect to claims 1 and 2, Burns '110 does not disclose anything other than conventional or generic "laser optics" that produce a conventional laser beam and does not meet Applicants' claim limitations or solve the problem solved by Applicants' claimed invention. While the Examiner recognizes that Burns '110 does not disclose a polymeric reflector as disclosed and claimed by Applicants, Burns also does not disclose reflecting a light pulse from any type of reflector (claim 1) or reflecting the light pulse from a first reflective surface in the reflector to a second surface in the reflector and outwardly from the second surface (claim 2). As described above, there is simply no disclosure in Burns of the structure or function of the "laser optics" represented by a single block 13 in Figure 1.

The Examiner has combined features disclosed by Marinelli et al. (US 5,890,796) to meet these claim limitations. The Examiner claims that it would be obvious to combine such features "for the purpose of directing equal intensity of light." There is no support in Burns for this rationale. As stated above, Burns '110 does not recognize the problems of prior art devices for detecting distance to an object as recognized by Applicants and does not include any teaching or suggestion of a need for "directing equal intensity of light." Therefore, there is no motivation for one of ordinary skill in the art to modify Burns as proposed by the Examiner.

Furthermore, Marinelli et al. '796 is directed to a laser illuminated lighting system and is non-analogous art such that the proposed combination is improper. Burns '110 is classified in a different U.S. and International classification than Marinelli et al. '796, and the two references combined by the Examiner do not even have a single common classification in their fields of search. There is no teaching, suggestion, or motivation in Marinelli et al. '796 to apply the unitary thin sheet optic used for a lighting system to a system or method for determining distance of an object, absent impermissible use of hindsight based on Applicants' disclosure.

With respect to claims 7-9, in addition to the improper combination of references described above, there is no disclosure or suggestion for determining an average travel time of said plurality of pulses and determining a distance of the object based on the average travel time (claim 7) in either Burns '110 or Marinelli et al. '796. Likewise, there is no disclosure or suggestion for aligning waveforms and calculating average travel time as claimed by Applicants (claim 8).

With respect to claims 3-5 and 15-17, the Examiner relies on an argument of inherency stated that "it is inherent that object is detected when any portion of said waveform has an amplitude greater than a predetermined threshold at said second time, since more light is reflected back to the detector if there is an object". Applicants respectfully disagree and traverse the rejection for the reasons stated above in addition to the following. The Examiner's argument is directly contrary to Applicants' disclosure and claims for detection of an object. The prior art relied upon does not even recognize the problem of detecting an object through fog or other environmental conditions and that "more light" is a relative term as recognized by Applicants and solved by the claimed invention by providing detection based on elapsed (travel) time in addition the intensity of the received light. This may be accomplished by decreasing the detection threshold as a function of elapsed time as illustrated and described with reference to Applicants' Figures 7, 10, and 11, or by increasing a gain value as illustrated and described with reference to Figures 8, 9, and 12. There is simply no disclosure (or any suggestion) in the prior art relied upon by the Examiner to detect an object as disclosed and claimed by Applicants in claims 3-5 and 15-17.

Claims 10-14 are directed to a system for determining a distance of an object. Contrary to the Examiner's assertion, Burns '110 does not disclose laser optics that receive and reflect a light pulse. As described above, there is no disclosure in Burns of the structure or function of the laser optics similar to that disclosed and claimed Applicants. The only mention of the laser optics in Burns is with reference to a generic box with a text label in Figure 1 which is described as "laser optics 13 which produces a laser beam 14 directed towards a target 15". Again, this is similar to the prior art described by Applicants and has the same deficiencies.

The Examiner admits that Burns does not disclose a polymeric light reflector and relies on Marinelli as disclosing this feature. As described in detail above and incorporated here by reference, this combination is improper because there is no motivation or suggestion for one of ordinary skill in the art to combine these features as proposed by the Examiner, and these references are non-analogous art. Furthermore, a number of features of claims 10-14 are neither disclosed nor suggested by the proposed combination, even if it were a proper combination of references.

With respect to claim 18, the Examiner is apparently relying only on Burns '110 in rejecting this claim under 35 USC §103. However, similar to the claims discussed above, claim 18 requires code for inducing a light source to emit a pulse that is reflected by a polymeric light reflector toward an object. This is neither disclosed nor suggested by Burns '110. To the extent the Examiner is relying on Marinelli to provide this feature, the proposed combination is improper as described above as there is no teaching or motivation to combine features as proposed by the Examiner and the references are non-analogous art.

For the reasons stated in detail above, Applicants respectfully submit that the rejection of claims 1-18 under 35 USC §103 is improper and should be withdrawn.

Summary

Applicants have made a genuine effort to respond to each of the Examiner's rejections and objections to advance the prosecution of this case. Applicants respectfully submit that all formal and substantive requirements for patentability have been met and that this case is in condition for allowance, which action is respectfully requested. If any further amendment is necessary to advance prosecution and place this case in allowable condition, the Examiner is courteously requested to contact the undersigned by fax or telephone at the number listed below.

An additional fee of \$194.00 is believed to be due for the presentation of additional claims. Please charge this fee and any other fee deemed necessary for the filing of this Amendment to Deposit Account 06-1510 (Ford Global Technologies, LLC). If there are insufficient funds in this account, please charge the fees to Deposit Account No.06-1505.

Respectfully submitted,



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Enclosure: Revised Figure 1

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